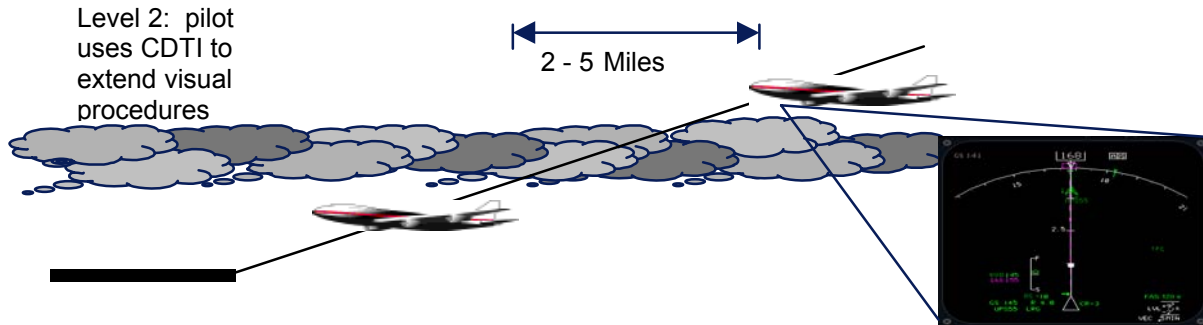


AW-2: Space Closer to Visual Standards

Using cockpit tools and displays to achieve VMC throughput capacity in all weather conditions.



Background

The difference between Visual Meteorological Conditions (VMC) and Instrument Meteorological Conditions (IMC) capacities are significant – for example, at San Francisco Airport, VMC arrival rate is 60/hour; this degrades to 30/hour when visual approaches cannot be performed. Typically, 30-40% of capacity is lost when weather criteria forces the airport to an Instrument Flight Rules (IFR) operations in IMC¹.

Most airports have established weather minima below which visual approaches cannot be conducted, primarily due to the difficulty for the pilot or controller to visually acquire the runway or traffic in such weather. Currently, the requirement for visual approaches is ceiling 500 feet above minimum vectoring altitude and visibility 3 miles. However, other environmental conditions such as haze, sunlight, smoke, and patchy clouds may effectively prohibit visual approaches at higher ceiling and visibility values.

The use of “Cockpit Display of Traffic Information (CDTI) Enhanced Flight Rules” may present pilots with an opportunity to use CDTI as an extension of the eyes, thus enabling visual approach operations to continue in marginal VFR, and potentially down to instrument conditions. This will be researched to determine what needs to be done to make this a viable capability.

Ops Change Description

The operational change for this initiative is described in the following sections:

- AW-2.1: “Enhanced Visual Approach” has already been granted Supplemental Type Certification (STC) approval.
 - *Cockpit*: This initial capability helps the pilot, through the use of the CDTI, to visually acquire and identify an aircraft that has been referenced as traffic by Air

¹ Table 1 in the FAA *Airport Benchmark Capacity 2001* report contains additional detail on the specific capacities lost at the 31 top airports in the NAS between visual approach conditions and instrument conditions.

Traffic Control, so the controller may clear the aircraft for a visual approach. The CDTI enables quicker identification since the pilot will be able to correlate the target aircraft and trajectory information from the CDTI to the actual traffic as seen out-the-window. Another objective is to better enable the pilot to obtain and maintain visual separation once it is initially established.

- *ATC*: With quicker identification of pertinent traffic, the need for additional traffic advisories or follow-on interactions between the pilot and controller should be reduced. No changes to 7110.65 (ATC procedures) are required for this initial application.
- AW-2.2: The Continued Visual Approach being researched to determine what needs to be done to make this a viable capability. Continued Visual Approach will allow a visual approach to continue during periods of intermittent loss of visual contact, bridging the gap between VFR minimums and the higher minimums at which visual approach operations are terminated today. This application would be especially effective in restoring lost capacity at airports during conditions of darkness, haze, fog, other obscurations, thin cloud layers or marine layers.
 - *Cockpit*: In this level, if visual contact with traffic has already been established while in-trail during a visual approach, and that traffic has been correlated with CDTI symbology, then CDTI may be approved as an extension of the pilot's eyes to allow short-term loss of visual contact. Visual contact must be re-established by 1,000 feet above ground level (AGL) and continue to a legal visual approach under Visual Flight Rules (VFR) airport conditions.
 - *ATC*: This may allow visual approach operations to continue as long as VFR conditions exist at the airport. Changes required may include additional phraseology to clearly define the procedure being authorized, but will not require significant changes to ATC technique.

Benefits, Performance and Metrics

- Reduction in en route delays resulting from better flows into airports.
- AW-2.1: Improved airport arrival rates. Operational experience, and pilot and controller acceptance of Enhanced Visual Approach has a potential of 1%-3% improvement in airport arrival rates at Louisville/Sandiford Airport (SDF).
- AW-2.2: Extended visual approach operations and arrival rates into lower weather conditions. Potential 30% regain of lost capacity during weather minimums between current visual approach minimums and basic VFR minimums.

Additional Benefits: See *Safe Flight 21 Pre-Investment Analysis Cost Benefit Analysis Phase II Report*, 1 May 2001

AW-2.1 Enhanced Visual Approach Scope and Applicability

- Currently being tested at SDF
- In-service evaluation and metrics collection at key site SDF – ongoing
- Expansion will be on airport-by-airport basis. Selection will be based on equipage capability.

Key Decisions

- UPS continued commitment to equip entire fleet with approved Level 1 avionics.
- Site selection based on collaborative decision between affected parties (e.g.: aircraft operator/pilots/FAA)

Key Risks

- Managing change in the acceptance of new procedures based on new technologies.
- Feasibility of procedures in mixed equipage environment.
- Impact of mixed equipage on achievement of benefits.

AW-2.2 Continued Visual Approach

Scope and Applicability

- Research is being conducted to determine how a pilot might use CDTI to extend the use of visual procedures in cases of short-term loss of visual contact. A High-level concept of operations for “CDTI Enabled Flight Rules” (CEFR) will be completed in February 2002. Based on this concept, Initial detailed procedures will be developed in the third quarter of FY02. An initial feasibility study including human-in-the loop simulations will be conducted by the end of FY02.
- Upon completion of the feasibility study and a decision to move forward, draft detailed procedures (for AFM/7110.65) will be developed in 1st Quarter FY03. In conjunction with this, an Operational Safety Assessment and High Fidelity Simulations will be conducted in the first two quarters of FY03. Initial flight-testing is planned for the end of FY03.
- Upon successful completing of the initial flight tests, Ops Spec / 7110.65 approval for initial CEFR at key site (SDF) will occur in FY04 (individual aircraft fleet STCs). In-

service evaluation and metrics collection at key site to determine the viability of usage will occur in FY04. Expansion will occur on airport-by-airport basis, with selection based on equipage capability.

Key Decisions

- Determination of how to proceed with Continued Visual Approach concept based on initial feasibility study.
- Proceed with initial CEFR at key site.
- Site selection based on collaborative decision between affected parties (e.g.: aircraft operator/pilots/FAA).
- Flight Standards / Air Traffic approval of initial concept / procedures.
- Aircraft Certification approval of equipment installation for this application (amended STCs as needed).
- Flight Standards District Office (FSDO) approval of airline Operations Specifications change.
- Satisfactory in-service evaluation.
- Air Traffic (AT) letter of authorization to allow extension of procedure to lower weather minimums at key site.
- AT approval to change of national 7110.65, to allow extension of procedure to lower weather minimums.

Key Risks

- Managing change in the acceptance of new procedures based on new technologies.
- Feasibility of procedures in mixed equipage environment.
- Impact of mixed equipage on achievement of benefits.
- Pilot acceptance.
- Operator acceptance.
- Controller acceptance.